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Building Student-centric ePortfolios in Practice:

Areas of Documentation in a Craft Learning Activity

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The present researchers studied elementary school students' use of electronic portfolios (ePortfolios) in their craft education over a three-year period. The data consisted of the textual and the visual content of the students' (n= 38) ePortfolios. The students' productions were analyzed and conceptualized through the qualitative analysis of content. Atlas.ti and SPSS programs were used to analyze, organize and visualize the data. The results indicate that the most emphasized areas in the textual content of students' ePortfolios were a combination of the process and the free learning reflection. The process aspects of the work were also clearly dominant in the documented visual images in the ePortfolios. The results confirmed that if ePortfolios are used in a flexible way with appropriate, open assignments, variations on use and the end-product are self-evident. The ePortfolio method enables an individual, rich, and versatile learning reflection, which could be used as evidence of learning or as support for learning – including the required elements for each function.

Keywords: electronic portfolio, craft education, documentation, reflection

Introduction

The present article focuses on the use of the electronic portfolio (hereafter ePortfolio) method with elementary students in craft education and analyzes the content of students' (from 4th to 6th grade) ePortfolios. Digital technology is widely used in our society and, consequently, Information and Communications Technology (ICT) is increasingly used in Finnish schools. At the same time, however, studies on ePortfolio use and resulting end products are limited in the elementary school context (Barrett, 2007; Meyer et al 2010). The present study aims at filling this gap. Nevertheless, several significant and inspiring development projects using ePortfolios have been carried out: in England and Scotland, the e-scape-project (e-solutions for Creative Assessment in Portfolio Environment) (Kimbell, 2012); in Canada ePearl-program (Electronic Portfolio Encouraging Active Reflective Learning) (Meyer et al., 2010), in the US, the historic Project Zero's Arts PROPEL (a comprehensive portfolio of student work) at the Harvard Graduate School of Education, The REFLECT- initiative (Researching Electronic portFolios: Learning, Engaging and Collaborating through Technology) (Barrett, 2007) and the Maker Movement's Open Portfolio Project; and the EUFolio-pilot project (run in seven European countries during 2013–15) to mention few with the same focuses.

In Finland, craft education (an obligatory school subject in Finland) has been an important part of basic education and it is seen as exploratory, inventive and experimental activity. The craft education puts emphasis on multi-materiality and development of versatile, working capabilities (FNBE, 2014). In the craft education, students are identifying design constraints, creating ideas and constructing design solutions by using various techniques. In the renewed Finnish National Core Curriculum, ICT is one of the seven transversal competences, and extensive integration of digital technologies is encouraged across school subjects at all levels (FNBE, 2014). Further, in recent years, many educators have become

interested in the maker movement (Anderson, 2012) and maker-centered learning (Clapp et al. 2016; Honey & Kanter, 2013; Seitamaa-Hakkarainen & Hakkarainen, 2017), which provides hands-on learning opportunities for students to enhance and cultivate both their craft skills and digital competences. Craft education contributes to implementation of digital documentation and use of multiliteracy competences. The core curriculum emphasizes the learner-centered approach and students' active metacognitive role in regulating their own learning processes (FNBE, 2014). Students are expected to work flexibly with collaborative technologies and also to participate in the practices of working with knowledge by solving authentic problems (Keune & Peppler, 2017; Seitamaa-Hakkarainen, 2009). Both the role of the learner and learning activities have fundamentally changed in recent years.

In this study, ePortfolios were mainly used as a learning diary or a process portfolio (Meyer et al., 2010), creating further options for highlighting and assessing performance by the student, peers, and teacher. The ePortfolio is defined as a tool for learners and instructors to monitor and support the learning process with concurrent, prospective, and retrospective reflections. Thus, the ePortfolio was used to make visible how students have developed over a period of time and, simultaneously, as a tool for assessing their development. In the present study, the analyzed contents of ePortfolios consisted of textual and visual data. The student's authentic voice made the content of portfolios more than an arbitrary collection of artefacts; at best, it provided a unique view of students' learning activity (Barrett, 2007; see also Paulson et al. 1991). The research questions were as follows:

1. What were the main areas of focus in the textual content of the student ePortfolios?
2. What did individual students emphasize within these main areas of focus?
3. How did the number of visual images increase and what were the main areas of focus in the visual content of the student ePortfolios?
4. How were the textual and visual content of the ePortfolios related?

ePortfolio as a learning tool

The electronic portfolio is a method that combines functionality and technology. It is necessary to define the concept accurately, because the portfolio method can be used for many different purposes and, therefore, the implementation of portfolios varies widely (Kimbell, 2012; see also Barrett, 2007; Sherman, 2006; Kimball, 2005). Researchers distinguish between, for example, working portfolios, reflective portfolios, and presentation portfolios, each of which are used for slightly different purposes. According to Kimbell (2012), the function of ePortfolios can vary from a mere container (pieces of evidence relating to the craft process) to a linear digital presentation of craft work. ePortfolios can resemble reports of the design and craft processes or they can involve a rich, dynamic real-time dialogue, i.e. a student's internal conversation about the craft process. According to Jimoyiannis (2012), the structure of ePortfolios may be defined by interrelated dimensions, such as the personal, technological, pedagogical, and contextual. The concrete content of the ePortfolio, in turn, can be divided into five main components a) artefact collection (documentation of artefacts created and learning exercises completed around the studied area), b) authentic assessment, c) structuring craft working (organizing the act of learning), d) personal learning (progress of personal learning), and e) collaborative learning (progress of shared learning projects) (Jimoyiannis, 2012).

According to Barrett (2007), the ePortfolio serves a more equitable and sensitive portrait of what students know and what they are able to do in comparison to traditional testing cultures (see also Keune & Peppler, 2017; Meyer, 2010). It also produces a richer and more valid assessment of students' competencies (See also Herman and Winters, 1994; Novak et al., 1996). In this study, we define the ePortfolio as a real-time, student-led method of tracking learning using authentic evidence (e.g., Barrett, 2010; Carmen and Christie, 2006; Lorenzo and Ittelson, 2005; Saarinen et al., 2016). In the present case,

the ePortfolio captures the craft process through students' reflections on it and the learner's agentic formal and informal reflections on the creative process, including considering oneself as a craft maker. There are several fundamental ePortfolio processes including collection (documentation), selection, reflection (self/peers, formal/ informal), evaluation, collaboration, celebration and validation (Barrett, 2007; Wade et al. 2005; Zubizarreta, 2004).

Learning through reflection

Student reflections on their learning experiences (reflections on working while working) provide the content of the electronic portfolios. According to Moon (2004), used concepts of reflection vary from simply reflecting to reflective learning and reflective writing. All these concepts refer to a purposeful process of framing and reframing of materials, where the intention is to learn as a result of reflection (see also Rickards, 2008). Because the collected material is most likely seen and assessed by others, it is, therefore, also influenced by these social and communicational factors. Reflection is seen as an approach as well as a method to improve the quality and depth of student learning (Hinett, 2002). Revisiting and reflecting on one's understanding provide opportunities to revise and reassess constructed understanding through cycles of explanation (Land & Zembal-Saul, 2003). According to Moon (2004), students can be seen as taking part actively in this defining process when they select meaningful material to be included in the ePortfolio.

Reflection through documentation requires constant teacher guidance and real-time support so that it will be carried out deeply, rather than superficially. Moon (2004) states that, in particular, the academic practice of examining hierarchical levels of activity distinguishes in-depth reflection from shallow description, because it guides deeper and more multi-layered reflections as separate from merely listing and repeating concrete craft actions. In-depth reflection involves expressions of the learner´s intention to learn, increasing variation regarding reflection and framing, and understanding the effects of emotion on learning. Learning reflection and monitoring one's own craft processes can serve as a means for furthering development, cultivating personal expertise, and exploring one´s maker identity (Rickards et al., 2008). In addition, as Barrett (2007) has stated, the individual differences in these outcomes also emphasize different paradigms; the constructivist learning approach supports an individual learning continuum, thereby emphasizing supporting the learning process with different types of evidence. The positivist approach stresses externally defined learning outcomes and highlights only the final successful results.

Method

Participants and the study setting

The present study took place in an elementary school (grades 1–9) located in a suburb of northern Helsinki, Finland´s capital city. Craft education is a common subject for both boys and girls; studies begin in the first grade and finish in the ninth grade. All students in the school worked with their own ePortfolio starting from the third grade. The present study focuses on the sixth-grade group of 38 students (24 girls and 14 boys) with four years of experience of using an ePortfolio. The students were nine years old when they started to use ePortfolios in grade three and 12 years old when they finished their elementary-level education. During that time, one student moved away and changed schools. The data consisted of all textual and visual images of all students' ePortfolios for the period of three years.

ePortfolios were created in a non-web-based iPad application called Book Creator. Cloud services were used to store the ePortfolios. Participant-constructed ePortfolios gave students the option of and responsibility to follow their own learning process by collecting pieces of evidence for it. Students made decisions regarding documentation; they took photographs, named the content of the image, explained

verbally what was happening in the image or, alternatively, reported a work instruction relating to the tools or techniques used. The equipment (iPad) for the group (2-4 persons) was available throughout the lessons and the ways of sharing the iPad were agreed within each group. The teacher gave feedback related to a student's ePortfolio once or twice per month. The length of an ePortfolio ranged from three to fifty pages per year. At present, the ePortfolio is used in this particular school as support for learning and as an assessment tool. At the end of every school term, the teacher and student individually assess the school year in an assessment debate. The ePortfolio plays an important role in this evaluation process; it offers samples of the working processes and advancement of the student's understanding but also reveals weaknesses and limitations.

Method of Data Analysis

First, qualitative content analysis was performed on the textual data from all students' ePortfolios. Second, qualitative content analysis was conducted on visual images in the ePortfolios. Our explanation of the method of data analysis will follow the same order: we will first introduce the analysis of textual data and, then, the visual data.

The textual content of the ePortfolios were analyzed by data-driven qualitative content analysis using a summative approach (Hsieh and Shannon, 2005). The computer program ATLAS.ti was used to analyze the data. Students' notes were organized in chronological order and each note was segmented to smaller meaningful units (i.e., the main content of the idea). The length of units varied from one to thirty words. The total number of segments was over 10,000. The analysis method was pilot tested within six ePortfolios, which revealed 17 subcategories of content. The frequencies of some codes were extensive, and others were merged together during the analysis. These subcategories were reorganized and placed under four main categories that were a) the craft artefact/ product b) the process c) the free reflection d) the formal reflection.

The craft artefact category included subcategories such as descriptions of the object students were working with, progress (transformation of the artefact), content of learning (learned pieces of information) and introduction (revealed background information). The common aspects of these subcategories were clearly related to the end product:

> 1:11 Here is my couch potato design. Its name is Söpis. (the object)
>
> 4:11 Now, these shorts are done with the exception of the back pockets. (the progress)
>
> 41:83 Today we'll research wool and put our ideas on the whiteboard. (the information)

Second was the process category, which included concurrent, prospective and retrospective observations of the working process. One note typically contained several temporal views from the past (completed work) to the current activity (the concurrent) and the future (planning for action).

> 9:35 We threaded the machine again and added the bobbing thread. (the concurrent)
>
> 12:69 Next time, I'll show how to do that unless something earth shattering happens. (the prospective)
>
> 22:77 I had to unpack these multiple times. Because I was at my grandmother's house, I was able to get a lot of work done. (the retrospective)

The most complex main category was the reflection category, which included sub-categories such as reflection of development, emotions, social observation, and equipment. The common themes characterizing this category were the learner´s own opinions; they were descriptions of their own thoughts.

> 5:14 I took pictures of how I've progressed over time. (the development)
>
> 9:6 Inserting and removing pins is boring!!! (the emotion)

4:46 P.S. Mark got annoyed because he did not know how to do his task (the social observation)

10:4 My work was interrupted by the annoyances of the machine. (the equipment)

The fourth main category, the formal reflection, included both self-assessment and peer-assessment. It was often indicated with a clear title by the evaluator and marked clearly in a different colour, but there were also a few lonely free-form self-assessments that focused on the student's own development or accomplishment of a demanding task.

5:59 I am proud of myself because I did not give up despite multiple challenges. (the self)

9:123 Alex learned to knit quite well, but at times some problems occurred while making the stocking cap. Alex is good at making a muffler on a knitting machine and is pretty fast at it as well. The muffler and the cap have a nice colouring. The tassel on the cap is nice. Even though the cap was kind of difficult to make it turned out well. (the peer)

The visual content was analyzed through qualitative content analysis. The total number of images was 1,920 and the annual accumulation varied between over 500 to nearly 800 images. The frequency of producing visual content varied between 3 to 57 images per year. The traditional visual methodologies appear to rely on subjective assessment of visual images rather than follow pre-made interpretation frames (Rose, 2001). In contrast, the content analysis of visual content in this study estimates the object through the categories established in advance and, hence, represents its own methodological interpretation of visual material.

The selection of images to be analyzed was the first step in the visual content analysis. This entailed deciding the appropriate number of images needed to form a representative view of the data in order to answer the research questions (Rose, 2001). In this study, the whole data set, i.e. all images documented by the students, was chosen, because it was noted that there were major quantitative and qualitative variations in the extent of visually documenting the craft process. However, it was considered preferable to focus analysis on a few justified categories rather than analyzing the visual data as a whole.

The first main category of visual data concerned the focus or object of image, the second category represented the phase of the process (designing, producing, sub-assembly and result) and the third focused on the linkage between the image and the textual content. These three main categories were subdivided according to certain subordinate codes, which are presented more detail in the Table 1.

Table 1. Codes and descriptions used for the visual material.

Category	Code	Description
A. Focus	The process	Presents the work (or detail of it) in a process (concurrent, retrospective). Tools visible in image, progress (slideshow).
	The artefact	Presents the product (exterior, dimensions, materials, sub-assemblies)
	The reflection	Indicates with an image a reflection of myself, equipment, classroom, emotions, development, social connections
	The background information /content of learning	Shows background information: content of learning, explaining the technic, sewing driver's license.
B. Phases of the craft	Designing /developing ideas	Presents the beginning phase of holistic craft process, present the material
	Making	Presents the production of the planned item (progress) Unravels the work (reverse) A tutorial of content / technics or content of learning

	Sub-assembly	A unit assembled separately but designed for incorporation with other units into a larger manufactured product/artefact.
	Result	Presents the final completed work/artefact
	Unconnected	Unconnected background information to the craft process
C. Linkage	A direct reference in text (more than 11 words) STRONG	Text explanation of the content of the image/video
	A short reference in text (1–10 words) MODERATE	Comments briefly on the image
	No reference NON-EXISTENT	The image has no explanation

As shown in the Table 1, the focus category consisted of four sub-codes. The first of these focused on the process, which presents the realization of making the designed artefact. The process was captured with the help of images of the concurrent, the retrospective or the prospective phase of working. It culminated in demonstrating the work, not the product of that work. The second sub-code, the craft artefact, included images of the product (exterior, dimensions, materials, sub-assemblies) and also the progress made while producing the artefact (emphasizing the product). Separating these two categories was challenging at a number of points. The images initially were analyzed separately from the texts, so any help from the students' textual description was not used. The image of the artefact was key to establishing the limit of the analysis: When the whole artefact was displayed in the image, it was categorized as belonging to the artefact sub-code, but if the artefact was photographed only in part, if it was considered unfinished. If tools were included, it was categorized as belonging to the process sub-code.

The third sub-code was reflection, which contained visual observations of the student her/himself, used equipment, emotions, development and social relationships. Images incorporated information about factors behind or alongside the learning task. The fourth sub-code was the content of learning, which consisted of images focusing the learned pieces of information (theory, technique), which the student judged to be important (see Figure 1a-1d).

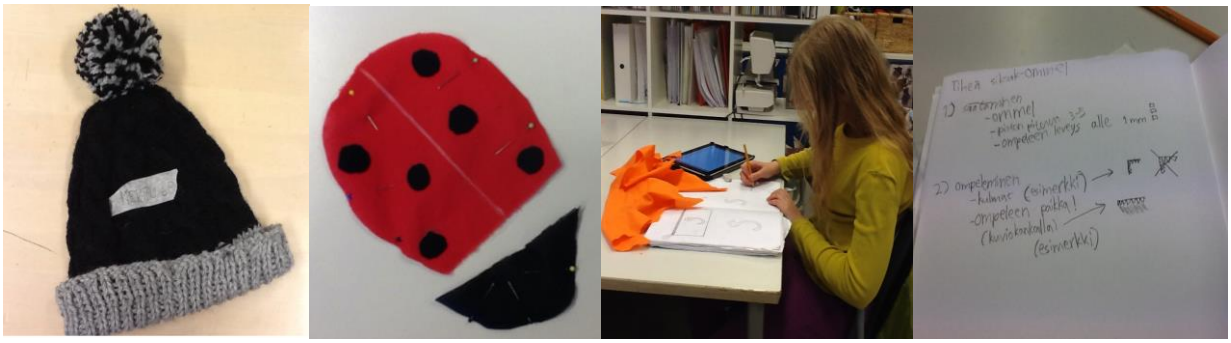

Figure 1a-1d. An example of categorizing the artefact (1a), the process (1b), the reflection (1c), and the content of learning (1d).

The second main category was the phase of the craft. The task for the student was to document every relevant event of the process. The holistic craft process has been seen to consist of three phases: 1) developing ideas and designing, 2) making and 3) evaluating (Pöllänen, 2009). Three of the aforementioned phases were suitable for visual analysis, but the evaluation phase was impossible to capture from the visual material and, therefore, it was replaced by two other sub-codes: the result and

the sub-assembly, which describes the completion of the artefact. There were also images, which could not be placed in any of these codes, so one sub-code was named off-topic (Figure 2a-2d).

Figure 2a-2d. The design (2a), the process (2b), the sub-assembly (2c), and the result (2d).

The third main category was about linkage between image and text. The visual material was often linked with a few lines describing and explaining the events. This code captured the strength of the linkage between the visual and the textual. Three sub-codes were identified: strong linkage (more than 11 words), moderate linkage (1–10 words), and non-existent linkage, with no connection to or explanation of the visual image.

Categories were tested by an external researcher for the inter-rater reliability-analysis. One of the authors (the first author) and an external researcher evaluated a sampling of six students' ePortfolios that were selected randomly. Both completed the analysis independently, and analysis of all textual and visual data from the sampling was studied and compared. The inter-rater reliability was 98,5%. Disagreements were the result of some details in images (selection between process/product) or the overlapping of two codes (free self-assessment/process concurrent).

Results

The following result section consists of two parts. First, we discuss the analysis of the textual content of the ePortfolios and, then, the results are presented with a coordinate system highlighting different emphases within the main focuses of the textual contents of individual students' ePortfolios. Thus, the first section will answer two research questions: 1) What were the main areas of focus in the textual content of the student ePortfolios? and 2) What did individual students emphasize within these main areas of focus? Secondly, we will present the analysis of the visual images and their development by answering the following two research questions: 3) How did the number of visual images increase and what were the main areas of focus in the visual content of the student ePortfolios? 4) How were the textual and visual content of the ePortfolios related? Excerpts from the ePortfolios are included in each section.

The main textual content of students' ePortfolios

In general, the students' ePortfolios revealed that they documented and reflected on their process and products regularly. The analysis of textual content of the students' ePortfolios included four main categories: the craft artefact/product; the process; the free reflection; the formal reflection. Each of the categories had several subcategories. Students talked about and named the artefact that they were working on or they described the progress of their work by naming the part they finished (or achieved that day). In the process category, instead, they described more of the concurrent activity (knitting), prospective (planning for action i.e., what I will do next), or retrospective aspects of the work (i.e., I completed the work with pockets). This analysis focused mainly on the textual data although there were linkages with visual images that will be revealed later on. The analysis of textual content also exposed two types of reflections: the reflection category that included reflection on development, emotions,

social observation, and equipment, and formal reflection that included both self-assessment and peer-assessment. In total, these four main categories covered over 90 % of all textual data (f=3172), making the process category was the largest (f=996), followed by the product category (f=712), the free reflection (f=703) and the formal reflection (n= 460).

In order to analyze what the emphasis within the different main focus areas revealed, the textual data was analyzed using the SPSS Statistic Data Program. In the analysis, these four main categories were distinctly distinguished. The main categories (presented above) were seen to construct opposite pairs: process, i.e., the making of the craft versus product, i.e., the final artefact. Similarly, the formal reflection, i.e., the tasks given by the teacher were paired with the free reflection (the students´ voluntarily produced reflective texts). Each student received a frequency value in the Scatterplot to point out their learning reflection across these abovementioned dichotomous categories. All these frequency values were placed in a system of coordinates (See Figure 3.). Each student had a value in every category, but the placing depended on the relationship between the dichotomous concepts.

Firstly, the students were distributed with an emphasis on process-product concepts. Most of the students (27) were positioned above the horizontal x-axis (highlighting the process side), one student was positioned directly on the x-axis (both categories equally dominant) and about a quarter of students (10) were positioned under the x-axis, highlighting the artefact/product side. Secondly, the free reflection was analyzed as dominant for most of the students (24) and the formal reflection was dominant for about a third of students (14). These values can be seen on the both sides of the vertical y-axis. To conclude, the majority of the students' ePortfolio contents represented a process description combined with free reflection (over 70%), and the product description combined with formal reflection was, therefore, in the minority.

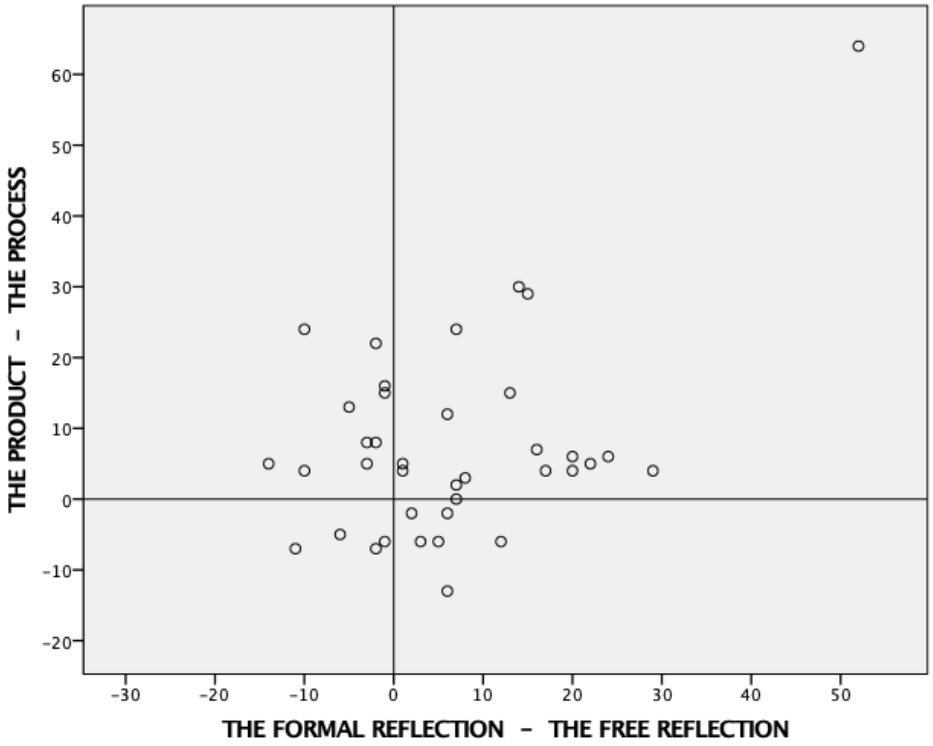

Figure 3. The analysis of textual data in the coordinate system. The frequency values of the formal reflection and the product are presented negatively in order to place the objects dichotomously within the coordinate system.

A typical ePortfolio with emphasis on the process and the free reflection encompasses a story of how the artefact was made, which stages can be distinguished, and also which tools were used. It also recalls the making events that, in the simplest way, formed a report of the work. On the other hand, the same making event could be a personal story of learning seen from an individual perspective. In contrast, the ePortfolio highlighting the product is also a story, but highlighting the artefact. The object of the story is strongly present even in the initial phase, and the product is named frequently and described precisely according to the vision that was conceived in the planning phase. The ePortfolio on the formal reflection side highlights the performance of the assignments and the follow-up reflection is less emphasized. On the free reflection side, the assignments as well as the follow-up reflection can be distinctly identified in the ePortfolios.

The nature of visual images in the ePortfolios

The visual content of the ePortfolio was analyzed through a summative approach. We focused our analysis on 3) How did the number of visual images increase and what were the main areas of focus in the visual content of the student ePortfolios? and 4) How were the textual and visual content of the ePortfolios related?

Figure 4 demonstrates the combined development of the image collection over a three-year period. Students' individual performance can be viewed horizontally and the number of visual images in each year vertically. The lowest line shows the collection of the visual content (images) during the fourth grade, the middle line shows the fifth grade and the highest line shows the sixth grade. Student number 25 moved away, and the documentation ended after the second year. Variation between the size of the collections is significant and also some individual variation can be detected. Largely, the differences between grades stay the same with the exception of a few students (Students 1, 7, 13, and 27).

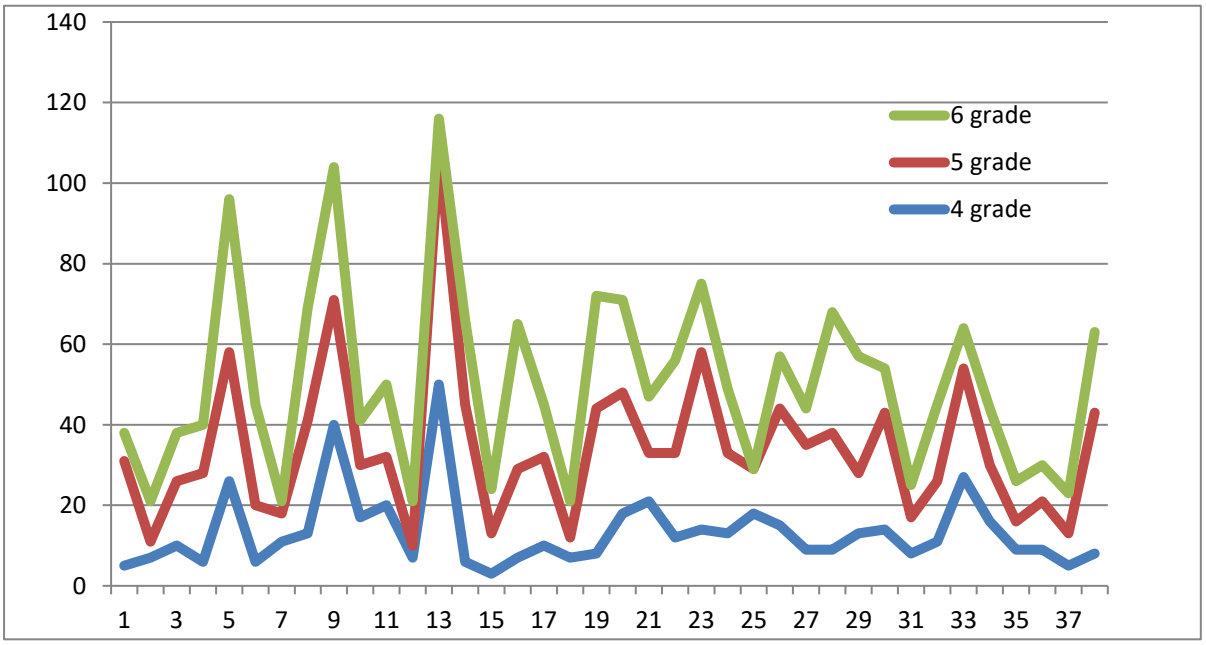

Figure 4. The visual documentation in numbers per student in grades 4–6 (2013–2016).

The differences between grades varied and the trend was not rising. During the fourth grade, the total number of images was 508, (Mean=13,36; Sd= 3–50), in the fifth grade 792 (Mean=20,84; Sd 3–57), and in the sixth grade 620 (Mean=16,76; Sd 3–38). The focus of the visual materials was divided as expected; process took the leading role (nearly half of the images), the artefact was the second most prominent (a quarter of the images), and the reflection was third. The content of learning was the smallest group and the group of unconnected material was also notably small work. As expected, the result code (at which stage the photo was taken) was divided quantitatively and appeared to be in the

same line as categories: on average, the students had the same categories in named order. Also, in this category, the production was the largest (over half of the images) and the result was in the second place. The design and sub-assembly had the smallest proportions, with five percent each. The third sub-code investigated the connection between the images and the textual content by counting how many words are linked to the image. The text was placed near the image and the connection was obvious or quite obvious. A moderate linkage (1–10 words) was found in over 70% of the (image & text) combinations and a strong linkage (more than 10 words) was found in 22% of cases. Non-existent linkage (no textual part) was in 7% of cases.

Findings

The aim of this study was to reveal the textual and visual content of the students´ ePortfolios and study the variations, frequencies and combinations of these contents. The data analysis of the present study revealed the versatile possibilities that the ePortfolio method offers, because it allows students to focus on different items when the assignment is flexible. In this study, students focused partly on following either the artefact/the product, which was the focus of the making or the process of the preparation. Reflection was also divided dichotomously between formal and informal reflections, pointing to the difference between an assignment versus a voluntary individual reflection. The distribution of results showed that the process as well as the free reflection were dominant in students' ePortfolios. The result could be explained by the fact that it was more convenient to document and reflect on an on-going process.

Students' reflection of the process and creation of the ePortfolio contained both assignments (formal assessment: self/peer) and reflections that students could freely choose to complete. The given instructions encouraged students to document regularly those events they considered meaningful. According to the teacher's instructions, accompanying text was requested but not demanded. There were only two assignments (self- and peer-assessment) and the free part of the reflection was not limited. The flexible nature of the assignment could partly explain the quantitative emphasis of the free reflection. Also, the free reflection appeared to attract students to do more than merely follow the given instructions. Some of the students had reading and writing difficulties and they were, therefore, encouraged to gather any kind of evidence from their on-going processes, which also demonstrates the benefits of free reflections.

The visual data collection over three years revealed that either this method was learned well during the first year and the number of images were not considerably rising year by year or the reflections were more dependent on the annual technique and the artefact. The reason could also lie in the quantity; students and activities have a personal or case-by-case quota of documentation, which does not vary considerably over the years or projects. A few students had some differences between years, but no significant systematic increase in documenting images can be observed. Every image taken represents a plan, a documentation decision or a major event experienced by the student. It is not essential to calculate the number of images, but it is still relevant to follow the development of documentation quantitatively. An appropriate number of items in the ePortfolio over the years is necessary for comprehensive documentation.

As expected, the artefact and the process are the dominant aspects of the images. It is understandable to pay the most attention to the concrete product and the ongoing activity in a functional school subject like craft education. Variations in the amount of reflection were partly unexpected, and partly not. Because of the narrow sampling size, no strong conclusions can be drawn, since the individual differences in constructing ePortfolios were so drastic. Reasons for variation may be due to personality, attitude towards school assigments and the subject, development of ICT skills, and access to tools, to name a few.

When the elements of the craft processes for individual projects were examined, the progression was revealed to be repetitive; the design step always began the process, which was ordinarily followed by the production phase. At the end of every process, the final result became crucial and this was apparent in the images as well as in the sub-assembly during the actual making.

Discussion

In our research, ePortfolios were studied through analysis of their everyday use by elementary-level students. The textual content of the ePortfolios was categorized by the main focus areas and the emphases were then analyzed. The visual contents were researched by their volume and relationship to each other. The results showed that concentrating on the process together with free reflection was the most popular way of using the ePortfolio. The text was often moderately combined with images and the volume varied significantly. The setting for this study with young students, long-term use, analysis of produced content, and the focus on the school subject of craft education is highly exceptional. Earlier ePortfolio studies differ from this research in many fundamental ways; the topics, the age of the target group, the management of documentation, the content of the data, and the duration of the data collection. Earlier research concentrated mostly on skill development (ePearl - learning environment: writing skills for 4–6 graders students/ music teaching- case study/ self-regulation and student core competencies), learning impact (The REFLECT-initiative: high school/secondary school students), or principally designing and testing an ePortfolio model (EUFolio: lower secondary school students). The greatest similarities can be found with the historic Project Zero projects Arts PROPEL (a comprehensive portfolio of student work) and Project APPLE (Assessing Projects and Portfolios for LEarning) at the Harvard Graduate School of Education. The similarities include working methods, classroom practices, and assessment settings. Also, the Maker Movement's Open portfolio concept had similarities such as the student-centric setting (student-led), a concentration on following development, and a focus on the making process.

ePortfolios are transformable tools for capturing the learning process with a wide range of different personalized and social components (cf. Jimoyiannis, 2012). Students have the opportunity, as they did in the present study, to concentrate on following their own learning process, share it with others, assess it, or make plans for future agentic activity. Technology enables students to return to past events to either review the events again and confirm the experience or complete other related functions such as assessment. In our data, this return was done with the help of images and textual content, which were the result of student-led documentation during the making processes. Some of the students used also video and audio recordings during the later years, which made communication more multidimensional, but could not be included in this data because of the small number produced. Recording presumably requires more organization and is not as familiar or easy an operation as photography and writing.

This study approached learning through two concepts: the ePortfolio as a learning tool and learning reflections as a component of the ePortfolio. Both concepts revealed inherent opportunities as well as challenges for data collection (documentation with selection, reflection, evaluation, and collaboration (cf. Zubizarreta, 2004; Wade et al. 2005; Barrett, 2007)). Differences between students' work varied quantitatively as well as in versatility even though students were guided similarly. It is therefore worth asking whether students used the ePortfolio for the same purposes and why the results differed from each other although the assumed starting point and guidance were similar. In our earlier research (Saarinen et al., 2016), the same students were asked to describe different functions and benefits of using the ePortfolio method and their depictions varied widely then as well. They listed the information collection and management, communication, and verification of development as practical functions. As educational benefits, they named, for example, supporting memory through stimuli and the rehearsing of learned concepts (Saarinen et al., 2016). When analysis is performed on individuals all these named

activities refer to different collecting densities, collecting focuses, and collecting phases. In light of these views, the differences become understandable. There are also many contextual interpreters like the ability to perform the assignment and desire to perform a task at a certain level. Still, even the weakest performance contained some ePortfolio processes (documentation, assessment) and gave a richer view of student´s competences than performance without this tool (cf. Barrett, 2007; Meyer, 2010; Keune & Peppler, 2017).

The content revealed the focus of students' interest, which, as one result of this research, demonstrates the extent of individual learning and/through reflection (cf. Moon, 2004). Individuals pay attention to different events and analyze activities distinctively even if the processes are reminiscent of each other. Also, the depth of reflection varies from superficially light, like a report, to inner dialogue and deeper analysis of the activities (cf. Kimbell, 2012). We would argue that the value of the ePortfolio to the learner is more than this collected documentation. An ePortfolio tells the story of the learner, which is adds/contributes to an individual's human capital. The ePortfolio is also the story of a learner's development, producing educational capital for and from learning. It is a story to be shared with others, raising each participant's social capital. Sharing enables versatile use of the collected data like to greater peer support, increased communication, and enriched social showmanship for the individual, to name only a few uses. The functions of learning reflections in education, as our study confirms, are versatile and an ePortfolio provides a workable base for implementing these activities.

As stated earlier, the diverse use of technology in our society (in this study: the ePortfolio in a school context) is generally seen as a self-evident skill held by every citizen. Schools should support competence in these basic ICT tools, even among the youngest students. This does not mean a fluent command of applications or professional competence, but the ability to operate these tools at the level appropriate to the students' own needs and development. More studies are needed to confirm what the essential skills and knowledge are at each age and what basic skills will be needed in the near future. Documenting, reflecting, and sharing one's own learning process, as in this study, could be one of the basic skills to be learned in elementary school. This guidance process also affects the teachers' role and performance. The student and the guidance of individual development will play a central role, while content and testing will become less important. Communication could, in part, be facilitated in ways other than face-to-face activities, which are limited to school hours and dependent on group size. Learning and reflecting on learning electronically can be take place regardless of time and place. Also, the guidance with visual reference to authentic contents is more concrete and directs students effectively. The ePortfolio method offers a purpose-built environment for individual communication and guidance, as this study validates.

There is a need for continued analysis of individual ePortfolio performance and the consequent development of ePortfolio usability in the school context. The depth of the learning reflections should also be studied more closely and developed to benefit learners' needs.

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